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I, David Russell Herald, Acting Commissioner of Patents, grant a Standard Patent with the following particulars:

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A MULTIPLE-LAYER, COOK-IN LAMINATE

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A multiple-layer, cook-in laminate having a first food contacting and sealing layer comprising:

from 5% to 95% by weight of linear low density polyethylene;

from 5% to 95% by weight of ethylene/alpha-olefin copolymers having a density of less than 0.915 g/cc; and

from 0% to 2% by weight of an anti-block agent;

wherein said food contacting and sealing layer is corona treated.

ABSTRACT

A multiple-layer, cook-in laminate having a first food contacting and sealing layer comprising:

from 5% to 95% by weight of linear low density polyethylene;

from 5% to 95% by weight of ethylene/alpha-olefin copolymers having a density of less than 0.915 g/cc; and

from 0% to 2% by weight of an anti-block agent;

wherein said food contacting and sealing layer is corona treated.

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DIVISIONAL APPLICATION

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INVENTION TITLE:

A multiple-layer, cook-in laminate

The following statement is a full description of this invention, including the best method of performing it known to us:

A MUTLIPLE-LAYER, COOK-IN LAMINATE

BACKGROUND OF THE INVENTION

This invention relates generally to gas impermeable, thermoplastic packaging film which can be heat sealed to itself or to another material to form a flexible or semi-flexible package. The invention relates more particularly to the use of such film in packaging food products in which the packaged product is submerged in heated water or autoclaved or retorted for a substantial period of time for pasteurizing or cooking the packaged product. The invention is especially concerned with a multiple-layer, cook-in laminate or package and the food contacting and/or sealing layer thereof, and with a method of making a cook-in film.

The term "pasteurizable" as used herein is intended to refer to packaging material structurally capable of withstanding exposure to pasteurizing conditions while containing a food product. Many food products require pasteurization after they have been hermetically packaged to destroy harmful microbes which grow in the absence of air. Specific pasteurization requirements tend to vary by country; however, limiting conditions probably are submersion of the hermetically sealed product in water at 95°C for one hour. Thus, for a bag to be characterized as pasteurizable, structural integrity of the bag must be maintained during pasteurization, i.e. the bag must have superior high temperature seal strength and must be delamination resistant under such time-temperature conditions.

Optionally, the packaging material is heat shrinkable under pasteurizing conditions so as to provide an attractively packaged pasteurized food product.

The term "cook-in" as used herein is intended to refer to packaging material structurally capable of withstanding exposure to cook-in time-temperature conditions while containing a food product. Cook-in packaged foods are essentially prepackaged, precooked foods that go directly to the consumer in that configuration which may be consumed with or without warming. Cook-in time-temperature conditions typically refer to a long slow cook, for example submerging in water at 70°-80°C for four to six hours. Such cook-in time-temperature requirements are

representative of institutional cooking requirements. Submerging at 80°C for twelve hours probably represents the limiting case. Under such conditions, a packaging material properly characterized as cook-in will maintain seal integrity and will be delamination resistant. Optionally, the packaging film is heat shrinkable under these conditions so as to form a tightly fitting package and preferably should have some tendency for product adhesion to prevent cook out or collection of juices between the surface of the food product and the interior surface of the packaging material.

A number of characteristics are required for cook-in packaging film. First, packages made from such film must have seal integrity under such conditions i.e. the heat sealed seams should resist being pulled apart. As a corollary, the film should be heat sealable either to itself or to another material. In the case of cook-in packages having thermoformed cavities for placement of a product, a non-forming cover web is typically vacuum sealed to the formed web to create the cook-in package.

Secondly, such materials must be delamination resistant, i.e. the multilayers making up the film must not separate or blister.

Additionally, the food contact layer of such film must qualify under the appropriate food laws and regulations for safe food contact.

A fourth consideration is the oxygen barrier or vapor barrier properties of the material, which are preferably high to maintain the freshness of the food contained therein.

Additional desirable characteristics in some package applications are heat shrinkability during the cook-in process to provide a packaging material which fits snugly around the product contained therein, as well as optical clarity where eye appeal of the packaged product is desired.

Various cook-in packaging materials are currently available in the market place. U. S. Patent No. 4,469,742 issued to Oberle et al describes a pasteurizable and/or cook-in shrink film which employs a hydrolyzed ethylene vinyl acetate copolymer (ethylene vinyl alcohol copolymer or

EVOH) in an irradiated, multilayer structure suitable for cook-in applications.

Another current film structure, such as shown in U.S. Patent No. 4,683,170 (Tse et al), has a five layer construction in which a core layer of ethylene vinyl alcohol copolymer is adhered to an inner ionomeric sealant layer, and to an outer nylon abuse layer, by means of respective tie layers, one on either side of the core layer. This latter structure requires the use of relatively thick tie layers. In some cases these tie materials, such as the Plexar series of resins available from Quantam and the CXA series of polymeric adhesive resins available from du Pont, are typically very specialized and relatively expensive materials.

Also of interest is U.S. Patent No. 4,735,855 to Wofford, et al which discloses a thermoformable polymeric laminate having a core layer of an oxygen barrier material, a polyamide layer disposed on either side of the core layer, the polyamide having controlled crystallinity, a sealant layer, an outer layer of a moisture barrier material, preferably polypropylene, and an intermediate layer disposed between the polyamide layer and each of the sealant layer and outer layer respectively, the intermediate layer being an anhydride grafted polyolefin.

Also of some interest is U.S. Patent No. 4,457,960 to Newsome which discloses a film structure for use in shrink bags including a sealing layer which may be a blend of linear low density polyethylene and ethylene/vinyl-acetate copolymers. U.S. Patent No. 4,457,960 is not directed to cook-in laminates or packages.

Of similar interest is U.S. Patent No. 4,801,486 to Quacquarella et al which discloses a film structure for use in shrink bags including a sealing layer which may be a blend of linear low density polyethylene and very low density polyethylene. U.S. Patent No. 4,801,486 is not directed to cook-in laminates or packages.

SUMMARY OF THE INVENTION

According to a first aspect of the present invention there is provided a multiple-layer, cook-in laminate having a food contacting and sealing layer comprising:

from 5% to 95% by weight of linear low density polyethylene;

from 5% to 95% by weight of ethylene/alpha-olefin copolymers having a density of less than 0.915 g/cc; and

from 0% to 2% by weight of an anti-block agent;

wherein said food contacting and sealing layer is corona treated.

Preferably, said food contacting and sealing layer comprises from about 80% to about 95% of said linear low density polyethylene and from about 5% to about 20% of said ethylene/alpha-olefin copolymers having a density of less than 0.915 g/cc.

The multi-layer laminate preferably has at least the structure: food contacting and sealing layer/barrier layer, more preferably at least the structure: food contacting and sealing layer/barrier layer/abuse layer.

In a preferred embodiment the laminate has the structure:

a first layer comprising the food contacting and sealing layer;

a second, adhesive layer comprising a polyolefin based adhesive material;

a third, polyamide layer;

a fourth layer comprising ethylene vinyl alcohol as the barrier layer;

a fifth, polyamide layer;

a sixth, adhesive layer comprising a polyolefin based adhesive material; and

a seventh layer comprising a polyamide as the abuse layer.

Advantageously, the third and fifth polyamide layers comprise nucleated nylon 6.

According to a second aspect of the present invention there is provided a multiple layer cook-in laminate comprising:

a food contacting and sealing layer comprising a blend of linear low density polyethylene and other ethylene copolymers;

a barrier layer; and

an abuse layer comprising a polyamide;

wherein said food contacting and sealing layer is corona treated.

In one embodiment, said other ethylene copolymers are ethylene/vinyl acetate copolymers.

The barrier layer preferably comprises ethylene vinyl alcohol polymer. A respective polyamide layer, preferably nucleated nylon 6, may be disposed on each side of said ethylene vinyl alcohol barrier layer. A respective intermediate layer comprising an anhydride grafted polyolefin may be disposed between one of the polyamide layers and the food contacting and sealing layer and between the other of the polyamide layers and the abuse layer.

According to a third aspect of the present invention there is provided a cook-in package having a food contacting layer comprising:

from 5% to 95% by weight of linear low density polyethylene;

from 5% to 95% by weight of ethylene/vinyl-acetate copolymers; and

from 0% to 2% by weight of an antiblock agent;

wherein said food contacting layer is corona treated for improved protein adhesion.

According to a fourth aspect of the present invention there is provided a method of making a cook-in film comprising:

coextruding an inner sealing layer comprising from 5% to 95% by weight of linear low density polyethylene and from 5% to 95% by weight of other ethylene/alpha-olefin copolymers having a density of less than 0.915 g/cc, a barrier layer and an abuse layer comprising a polyamide;

quenching the coextruded film; and

corona treating the sealing layer.

Preferably, the food contacting and/or sealing layer is corona treated, in accordance with any aspect of the invention, within the range of from about 40 dynes/cm to about 60 dynes/cm, preferably to 50 dynes/cm.

The polyamide layers which may be disposed on respective sides of the barrier layer in some embodiments described above advantageously have controlled crystallinity.

DEFINITIONS

"Controlled crystallinity" refers to at least some control in the nature and extent or crystallization in a polyamide, resulting in a package with adequate or improved package tightness. Preferably, controlled crystallinity of polyamides is achieved by including a small amount of a nucleating agent such as talc. These agents are believed to set up nucleating sites in the resin around which more consistently sized crystallites grow. This in turn provides improved package tightness.

"Corona discharge treatment" or "corona treating" are used herein to refer to subjecting the surfaces of thermoplastic materials, such as polyolefins, to corona discharge, ie. the ionization of a gas such as air in close proximity to a film surface, the ionization initiated by a high voltage passed through a nearby electrode, and causing oxidation and other changes to the film surface.

"Oxygen barrier" is used herein to refer to polymeric materials having oxygen transmission rates of less than about 10cc/m^2, in 24 hours at 73°F (STP), and preferably less than about 1cc/m^2, 24 hours, 73°F (STP). Such materials include e.g. ethylene vinyl alcohol copolymer, and vinylidene chloride copolymers.

"Polyamide" is used herein to refer to high molecular weight polymers having amide linkages along the molecular chain, and refers more specifically to synthetic polyamide such as various nylons.

"Ethylene vinyl alcohol copolymer" is used herein to refer to a vinyl alcohol copolymer having an ethylene comonomer, and prepared by e.g. hydrolysis of vinyl acetate copolymers, or by chemical reactions with polyvinyl alcohol.

"Polyolefin" is used herein broadly to include polyethylene, ethylene copolymers having a small amount of a comonomer such as vinyl acetate, ethylene-alpha olefin copolymers, polypropylene,

polybutene, and other resins falling in the "polyolefin" family classification.

"LDPE" designates branched chain polyethylene made by the high pressure process and will have a density below 0.940 g/cc and, most often a density of 0.915 to 0.925 as the 0.926 to 0.939 range is often referred to as the medium density range.

"LLDPE" refers to linear low density polyethylene which generally is understood to include that group of ethylene/alpha-olefin copolymers having limited side chain branching and which fall into a density range of 0.910 to 0.940 g/cc. Sometimes linear polyethylene in the density range from 0.926 to 0.940 is referred to as linear medium density polyethylene (LMDPE). Typical brand names are Dowlex from Dow Chemical Company, Ultzex and Neozex from Mitsui Petro Chemical Company, and Sclair from duPont. The alpha-olefin copolymers are typically butene-l, pentene-1, hexene-1, octene-1, etc.

"Very low density polyethylene" (VLDPE) and "ultra-low density polyethylene" (ULDPE) refer to ethylene/alpha-olefin copolymers which have a density of less than about 0.915 and, more specifically, usually 0.912 or below and may be below 0.89. Typical VLDPE resins are those designated DFDA by Union Carbide and are believed to principally or usually have butene, or isobutene as a comonomer. The very low density polyethylenes as compared to LLDPE, usually have significantly higher copolymer content and distinctly different properties making them a distinct class of polymers. Typically, resins designated "ULDPE" resins come from Dow and are believed to have octene as the comonomer. There is a slight difference in properties which is thought to be attributable to the comonomer. As used herein the term "linear ethylene/alpha-olefin copolymer having a density of less than 0.915 g/cc" encompasses both VLDPE and ULDPE. (See "Plastics Technology Magazine" for September, 1984 at Page 113 where an article entitled, "INTRODUCING VERY LOW DENSITY PE" appears.)

BRIEF DESCRIPTION OF THE DRAWINGS

Further details are given below with reference to the sole figure drawing, wherein Fig. 1 is a schematic cross-section of a preferred embodiment of a cook-in structure in accordance with the

present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring specifically to the sole drawing, in Fig. 1 a schematic cross-section of a preferred embodiment of the cook-in laminate of the invention is shown. The film structure is directed to a multi-layer composite having the generalized structure of (outside) A/B/C/D/C/B/E (inside) where A is an outer abuse layer, B is an intermediate adhesive layer, C is a polyamide layer, D is an oxygen barrier layer, and E is a sealant layer.

Outer layer 10 serves as an abuse layer. Preferably, outer layer 10 is a polyamide, more preferably, a nylon 6 such as Ultramid KR-4407F provided by BASF. A minor amount of an antiblock agent, such as 10853 provided by Ampacet, may also be included in layer 10.

Oxygen barrier layer 16 is preferably an ethylene vinyl alcohol copolymer such as EVAL EP-H101A available from Evalca. This material exhibits excellent oxygen barrier properties at low humidities with lesser barrier qualities at higher humidities.

On either side of the barrier layer 16 are polyamide layers 14 comprising nylon 6 and more preferably nucleated nylon 6. The nucleating agent in the nylon 6 is believed to set up nucleation sites around which more consistently sized crystallites grow. This in turn provides improved package tightness in the final packaged product. A suitable nucleating agent is, for example, talc.

Sealant layer 20 generally serves as both a food contacting and a sealing layer and is preferably a blend of linear low density polyethylene and some other ethylene copolymer. For example, it has been found that a blend of LLDPE and ULDPE provides for good high temperature sealing in the cook-in regime and also for good lower temperature tack sealing. Thus, when a non-forming web in accordance with the present invention is sealed to a forming web, also of the present invention, both the high pressure seal, formed by heating the two webs between high pressure seal bars and the low pressure seal, which is formed by atmospheric pressure when the filled package is evacuated, are capable of withstanding the rigors of the cook-in regime. Also

within the scope of the present invention are blends of LLDPE with EVA or VLDPE. Furthermore, when corona treated, preferably within the range of from about 40 dynes/cm to about 60 dynes/cm and most preferably at about 50 dynes/cm, all of such blends demonstrate a synergistic effect in providing improved protein adhesion.

The sealing layer may include in the range of about 5% to 95% by weight LLDPE and, correspondingly, 5% to 95% of other ethylene copolymers. Preferably an ethylene/alpha-olefin is blended with the LLDPE, most preferably ULDPE, with such comprising 15% by weight of the sealant layer. Generally, sealability increases with increasing ULDPE. Thus, for embodiments having very high ULDPE content, such as that disclosed below in Example 7, lower seal temperatures are required for the high pressure seal and greater seal tack is demonstrated by the low pressure seal. Correspondingly, if EVA is blended with LLDPE in the sealant layer, sealability will increase with increasing EVA.

As depicted in the figure, the sealant layer is preferably a relatively thick layer, more preferably forming in excess of 30% of the total film structure thickness. This provides some moisture protection for the core layer 16.

It is also preferred that the sealant layer or the abuse layer or both include a minor portion of an antiblock agent for ease of handling. It was found that the same mechanism of the present invention which provides for improved protein adhesion of the sealant layer to the packaged meat product during cooking also keeps the film from coming off of the roll because of adhesion of the sealant layer to the abuse layer. Because inclusion of antiblock in the polyamide abuse layer, such as is described below in Examples 1, 2, and 3, reduces the optical qualities of the present laminate, it is most preferred that such agent is included only in the sealant layer. Thus, one preferred sealing layer composition includes 83% by weight LLDPE, 15% by weight ULDPE and 2% by weight of an anti-block agent.

Tie layers 12 and 18 respectively assure adhesion between polyamide layers 14 and outer layer 10 and sealant layer 20 respectively. These tie layers may be identical or different from each other, and may include a wide range of anhydride/grafted polyolefins including those based on

ethylene vinyl acetate copolymer, polypropylene, low density polyethylene, linear low density polyethylene, and very low density polyethylene. Commercial examples of such materials are those marketed under the name Plexar available from Norchem, the CXA series from DuPont, and the like.

In one embodiment of the present invention, the multilayer film can be used as a non-forming web in combination with a forming web to produce the final package. In a typical packaging operation, a forming web is formed into a mold to provide a film cavity in which a food product is placed. Many meat products are packaged in this manner. A non-forming web such as the described laminate can then be placed over the cavity and vacuum sealed by means well known in the art to the periphery of the forming web. The sealant layer 20 will then bond to the sealant material of the forming web. Of course, the film can also be bonded to itself where it is desirable to use the film to make a bag or pouch.

One advantage of the present invention is that it may be corona treated for excellent protein adhesion during cook-in. However, the present sealing layer is also well suited for cook-in applications for which either no protein adhesion or only limited protein adhesion is preferred. For example, in skin-on turkey breast cook-in processes the skin is either left on the breast or removed from and then replaced onto the turkey breast during preliminary treatment. In either case, protein adhesion of the turkey skin to the inner sealant layer during cook-in will cause the skin to strip from the turkey meat during removal of the package by the consumer. Thus, for such application it is preferred that the forming web, which is drawn into the shape of a turkey breast and which contacts the skin, has a sealing layer which does not exhibit protein adhesion qualities. In such cases, cook-out is limited by providing a non-forming web, which does not contact the breast skin, having protein adhesion qualities. Furthermore, by the present invention, a corona treated non-forming web may be sealed to a non-corona treated forming web with the excellent sealing properties discussed above with respect to both high pressure and low pressure seals being achieved.

The present cook-in structure represents several other significant improvements over the prior art. For example, the nylon abuse layer of the described film has a high heat resistance and can

withstand the high sealant temperatures associated with the sealing of non-forming webs to forming webs. Such property is also important for an abuse layer which must withstand the time and temperature requirements of the cook-in regime. Moreover, because nylon is not very thermally insulative, such an abuse layer allows the interior of the film, which is held against the cold meat product therein, to experience a higher temperature in the shrink tunnel, thereby providing improved free shrink.

However, because nylon is not a very effective moisture barrier, it has been found useful to thicken tie layer 12 which binds the outer abuse layer to that inner nucleated nylon 6 layer which is adjacent the moisture sensitive EVOH core. Because of the expense involved in providing such a thickened tie layer, it has further been found to be advantageous to provide two relatively thin tie layers between which is interposed a relatively thick intermediate layer of, preferably, an ethylene alpha-olefin copolymer.

Laminates as described may be made by extruding the various resins through five, six or seven extruders. The extrudate is passed through a die where the layers are joined and form a total coextrusion. The multilayer composite exits the die lips and is quenched. The film is wound into mill logs, and then taken, for example, to a Dusenbury slitter to be slit to the desired width. After quenching the film, the sealing layer is subjected to corona treating.

Two of the resin streams can be split to provide the polyamide layers and the adhesive layers. In the event that layers 12 and 18 comprise different resins, an additional extruder is used. The outer layer 10 may actually be extruded through two contiguous extruders, in which case an additional extruder would be required.

In order to optionally orient the laminate, it could be longitudinally oriented, calendared, and/or tenterframed.

In order to optionally orient the laminate, it could be longitudinally oriented, calendered, and/or tenterframed.

The invention may be further understood by reference to the following examples.

EXAMPLE 1

A thermoformable cook-in laminate as described with reference to Figure 1 was prepared by extruding the various resins listed below through six separate extruders.

A first extruder provided a sealant layer comprising a blend of 15% ethylene/vinyl-acetate (PE1375 from Rexene which has 3.6% vinyl-acetate), 83% LLDPE (Dowlex 2044A from Dow), and 2% of an antiblock agent (10853 from Ampacet).

A second extruder provided an LLDPE based adhesive (Bynel 4125 from Dow).

A third extruder provided a split stream of a nucleated nylon 6 (Ultramid KR4418).

A fourth extruder provided the core layer of an oxygen barrier material (EVAL EP-H101A ethylene vinyl alcohol copolymer from EVALCA).

A fifth extruder provided an ethylene vinyl acetate-based anhydride-grafted polymeric adhesive (DuPont Bynel CXA 3095).

A sixth extruder provided an abuse layer comprising a blend of 98% of polycaprolactam, nylon 6 (Ultramid KR-4407F from BASF) and 2% of an antiblock agent (10853 from Ampacet).

These extrudates were joined in the arrangement described where they entered a coextrusion die. The resulting composite exited the die lips and was quenched, then wound into mill logs, and slit to the desired width using Dusenbury slitters.

The resulting laminate had an overall thickness of about 4.00 mils.

The sealant layer had a thickness of 1.16 mils or 29% of the overall laminate thickness.

The LLDPE tie layer had a thickness of .32 mils or 8% of the overall laminate thickness.

The polyamide layers had thicknesses of .28 mils (adjacent the thicker adhesive layer) and .32 mils, representing 7% and 8% of the overall laminate thickness, respectively.

The core layer had a thickness of .40 mils or 10% of the overall laminate thickness.

The EVA based tie layer had a thickness of .92 mils or 23% of the overall laminate thickness.

The abuse layer had a thickness of .60 mils or 15% of the overall laminate thickness.

The sealant side of the laminate was corona treated to 50 dynes/cm.

EXAMPLE 2

A thermoformable cook-in laminate was prepared as described in Example 1, but with the first extruder providing a sealant layer comprising a blend of 5% EVA (LD-318.92 from Exxon which has a vinyl-acetate content of 9.0%), 93% LLDPE (Dowlex 2044A from Dow) and 2% of an antiblock agent (10853 from Ampacet).

EXAMPLE 3

A thermoformable cook-in laminate was prepared as described in Example 1, but with the first extruder providing a sealant layer comprising a blend of 15% ULDPE (Attane 4001 from Dow), 83% LLDPE (Dowlex 2044A from Dow) and 2% of an antiblock agent (10853 from Ampacet).

EXAMPLE 4

A thermoformable cook-in laminate was prepared as described in Example 1, but with the first extruder providing a sealant layer comprising a blend of 15% ULDPE (Attane 4001 from Dow), 80% LLDPE (Dowlex 2044A from Dow) and 5% of an antiblock agent (10853 from Ampacet)

and with the sixth extruder providing an abuse layer comprising 100% nylon 6 (Ultramid KR-4407F from BASF)

EXAMPLE 5

A thermoformable cook-in laminate was prepared as described in Example 1, but with the first extruder providing a sealant layer comprising a blend of 15% ULDPE (Attane 4001 from Dow), 83% LLDPE (Dowlex 2044A from Dow) and 2% of an antiblock agent (10853 from Ampacet) and with the sixth extruder providing an abuse layer comprising 100% nylon 6 (Ultramid KR-4407F from BASF).

EXAMPLE 6

A thermoformable cook-in laminate was prepared as described in Example 5 above but the sealant side of the laminate was not corona treated.

EXAMPLE 7

A thermoformable cook-in laminate is prepared as described in Example 1 above but with the first extruder providing a sealant layer comprising a blend of 15% LLDPE (Dowlex 2044A from Dow), 83% ULDPE (Attane 4001 from Dow), and 2% of an antiblock agent (10853 from Ampacet).

EXAMPLES 8 - 13

Thermoformable cook-in laminates were prepared as described above in Examples 1 - 7, respectively, but such that each laminate had an overall thickness of 6.0 mils, the percent of overall thickness of each layer being the same as described in Example 1.

EXAMPLES 14 - 19

Thermoformable cook-in laminates were prepared as described above in Examples 1 - 7, respectively, but such that each laminate had an overall thickness of 8.0 mils, the percent of overall thickness of each layer being the same as described in Example 1.

Although the present invention has been described in conjunction with preferred embodiments, it is to be understood that modifications and variations may be utilized without departing from the principles and scope of the invention, as those skilled in the art will readily understand. For example, the present sealing layer could be used in place of the sealing layer of any of the thermoformable cook-in laminates disclosed herein. Accordingly, such modifications and variations may be practiced within the scope of the following claims.

Throughout this specification and the claims which follow, unless the context requires otherwise, the word "comprise", and variations such as "comprises" and "comprising", will be understood to imply the inclusion of a stated integer or step or group of integers or steps but not the exclusion of any other integer or step or group of integers or steps.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A multiple-layer, cook-in laminate having a food contacting and sealing layer comprising:

from 5% to 95% by weight of linear low density polyethylene;

from 5% to 95% by weight of ethylene/alpha-olefin copolymers having a density of less than 0.915 g/cc; and

from 0% to 2% by weight of an anti-block agent;

wherein said food contacting and sealing layer is corona treated.

2. The laminate of claim 1 wherein said food contacting and sealing layer comprises from about 80% to about 95% of said linear low density polyethylene and from about 5% to about 20% of said ethylene/alpha-olefin copolymers having a density of less than 0.915 g/cc.

3. The laminate of claim 1 or 2 which has at least the multi-layer laminate structure: food contacting and sealing layer/barrier layer.

4. The laminate of claim 3 which has at least the multi-layer laminate structure: food contacting and sealing layer/barrier layer/abuse layer.

5. The laminate of claim 4 which has the structure:

a first layer comprising the food contacting and sealing layer;

a second, adhesive layer comprising a polyolefin based adhesive material;

a third, polyamide layer;

a fourth layer comprising ethylene vinyl alcohol as the barrier layer;

a fifth, polyamide layer;

a sixth, adhesive layer comprising a polyolefin based adhesive material; and

a seventh layer comprising a polyamide as the abuse layer.

6. The laminate of claim 5 wherein said third and fifth polyamide layers comprise nucleated nylon 6.

7. The laminate of any one of claims 1 to 6 wherein the food contacting and sealing layer side thereof is corona treated within the range of from about 40 dynes/cm to about 60 dynes/cm.

8. The laminate of claim 7 wherein said food contacting and sealing layer side is corona treated to 50 dynes/cm.

9. A multiple layer cook-in laminate comprising:

a food contacting and sealing layer comprising a blend of linear low density polyethylene and other ethylene copolymers;

a barrier layer; and

an abuse layer comprising a polyamide;

wherein said food contacting and sealing layer is corona treated.

10. The laminate of claim 9 wherein said other ethylene copolymers are ethylene/vinyl-acetate copolymers.

11. The laminate of claim 9 or 10 wherein said barrier layer comprises ethylene vinyl alcohol copolymer.

12. The laminate of claim 11 including a respective polyamide layer disposed on each side of said ethylene vinyl alcohol barrier layer.

13. The laminate of claim 12 wherein said polyamide layers comprise nucleated nylon 6.

14. The laminate of claim 12 or 13 including a respective intermediate layer disposed between one of the polyamide layers and the food contacting and sealing layer and between

the other of the polyamide layers and the abuse layer and comprising an anhydride grafted polyolefin.

15. The laminate of any one of claims 9 to 14 wherein the food contacting and sealing layer side thereof is corona treated to 50 dynes/cm.

16. A cook-in package having a food contacting layer comprising:

from 5% to 95% by weight of linear low density polyethylene;

from 5% to 95% by weight of ethylene/vinyl-acetate copolymers; and

from 0% to 2% by weight of an antiblock agent;

wherein said food contacting layer is corona treated for improved protein adhesion.

17. A method of making a cook-in film comprising:

coextruding an inner sealing layer comprising from 5% to 95% by weight of linear low density polyethylene and from 5% to 95% by weight of other ethylene/alpha-olefin copolymers having a density of less than 0.915 g/cc, a barrier layer and an abuse layer comprising a polyamide;

quenching the coextruded film; and

corona treating the sealing layer.

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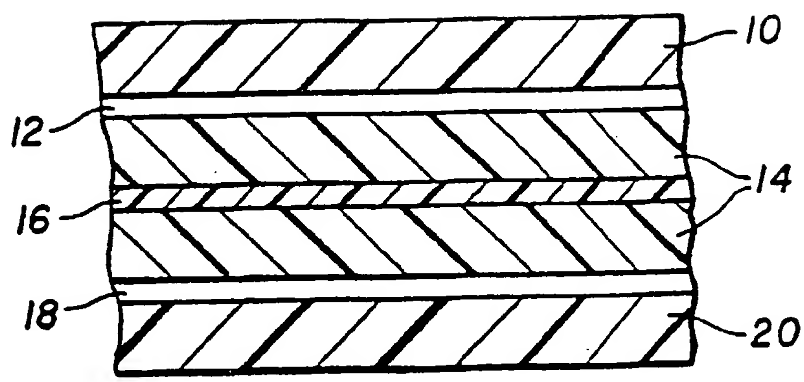

FIG. 1